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WE CLAIM:

1. A method of reducing a microbial population on poultry during processing comprising:
5 applying to the poultry during processing a mixed peroxycarboxylic acid antimicrobial composition in an amount and time sufficient to reduce the microbial population.
2. The method of claim 1 wherein the poultry being processed comprises
10 chicken, turkey, ostrich, game hen, squab, guinea fowl, pheasant, duck, goose, emu, or a combination thereof.
3. The method of claim 1, comprising applying the mixed peroxycarboxylic acid composition by submersing the poultry.
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4. The method of claim 3, comprising applying the mixed peroxycarboxylic acid composition by submersion scalding, by submersion chilling, by hydro-cooling or chilling, tumble immersion, or by a combination thereof.
- 20 5. The method of claim 3, comprising applying the mixed peroxycarboxylic acid composition for a duration and at a concentration selected to yield visually imperceptible darkening of subcutaneous bruises, pooled blood, or a combination thereof.
6. The method of claim 1, comprising applying the mixed peroxycarboxylic acid
25 composition by rinsing or spraying the poultry.
7. The method of claim 6, comprising applying the mixed peroxycarboxylic acid composition with a de-feathering picker, by inside-outside bird washing, by dress rinsing, by spray rinsing, or a combination thereof.

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8. The method of claim 1, comprising applying the mixed peroxycarboxylic acid composition to a whole poultry carcass.

9. The method of claim 8, comprising applying the mixed peroxycarboxylic acid composition to a poultry carcass that has been subjected to stunning, bleeding, scalding, picking, singeing, or a combination thereof.

10. The method of claim 1, comprising applying the mixed peroxycarboxylic acid composition to one or more dismembered parts of a poultry carcass.

11. The method of claim 10, comprising applying the mixed peroxycarboxylic acid composition to a poultry carcass that has been subjected to beheading, removing feet, eviscerating, neck-cropping, portioning, or a combination thereof.

12. The method of claim 11, comprising applying the mixed peroxycarboxylic acid composition to a poultry leg, thigh, breast quarter, wing, or combination thereof of a poultry that has been subjected to portioning.

13. The method of claim 10, comprising applying the mixed peroxycarboxylic acid composition to a poultry that has also been subjected to boning.

14. The method of claim 13, comprising applying the mixed peroxycarboxylic acid composition to a boned poultry leg, thigh, breast, wing, or combination thereof.

15. The method of claim 1, comprising applying the mixed peroxycarboxylic acid composition by air chilling.

16. The method of claim 15, wherein the mixed peroxycarboxylic acid composition comprises peroxyacetic acid and peroxyoctanoic acid.

17. The method of claim 15, wherein air chilling comprises applying a gaseous or densified fluid antimicrobial composition.

5 18 The method of claim 1, further comprising exposing the poultry to activated light.

19. The method of claim 18, wherein the activated light comprises ultraviolet light, infrared light, visible light, or a combination thereof.

10 20. The method of claim 1, wherein the mixed peroxycarboxylic acid antimicrobial composition comprises:

at least about 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to 6 carbon atoms; and

15 at least 0.5 ppm of one or more carboxylic acids having up to 12 carbon atoms.

21. The method of claim 20, wherein the mixed peroxycarboxylic acid composition comprises one or more peroxycarboxylic acids having from 2 to 6 carbon atoms and a peroxycarboxylic acid having from 7 to 12 carbon atoms.

20 22. The method of claim 21, wherein the mixed peroxycarboxylic acid composition comprises peroxyacetic acid and peroxyoctanoic acid.

23. The method of claim 22, wherein the mixed peroxycarboxylic acid antimicrobial composition further comprises stabilizing agent, wetting agent, hydrotrope,
25 thickener, foaming agent, acidifier, pigment, dye, surfactant, or a combination thereof.

24. The method of claim 1, wherein the microbial population is the result of contamination by fecal matter or digestive tract content.

30 25. The method of claim 24 wherein the microbial population is reduced in a continuous online process.

26. The method of claim 1, further comprising, after applying:
recovering the applied mixed peroxycarboxylic acid antimicrobial composition; and
adding to the recovered composition a sufficient amount of a mixture of
5 peroxycarboxylic acids to yield a recycled mixed peroxycarboxylic acid antimicrobial
composition.

27. The method of claim 26, further comprising applying the recycled
composition to poultry during processing.

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28. The method of claim 26, wherein the mixture of peroxycarboxylic acids
comprises peroxyacetic acid and peroxyoctanoic acid.

29. The method of claim 28, wherein the mixture of peroxycarboxylic acids
15 comprises about 30 to about 60 weight-% acetic acid, about 1 to about 15 weight-% octanoic
acid, about 2 to about 12 weight-% hydrogen peroxide, about 6 to about 16 weight-%
peroxyacetic acid, and about 0.1 to about 5 weight-% peroxyoctanoic acid, and about 0.1 to
about 2 weight-% chelating agent.

20 30. The method of claim 26, wherein the recycled mixed peroxycarboxylic acid
antimicrobial composition comprises:
at least about 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to
6 carbon atoms; and

at least 0.5 ppm of one or more carboxylic acids having up to 12 carbon atoms.
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31. The method of claim 30, wherein the recycled mixed peroxycarboxylic acid
composition comprises one or more peroxycarboxylic acids having from 2 to 6 carbon atoms
and a peroxycarboxylic acid having from 7 to 12 carbon atoms.

30 32. A method of reducing a microbial population on poultry during processing
comprising:

contacting the poultry during processing with a gaseous or densified fluid
peroxycarboxylic acid antimicrobial composition in an amount and time sufficient to reduce
the microbial population.

5 33. A method of recycling water previously applied to poultry, the method
comprising:

recovering a mixed peroxycarboxylic acid antimicrobial composition previously
applied to poultry; and

10 adding to the recovered composition a sufficient amount of a mixture of
peroxycarboxylic acids to yield a recycled mixed peroxycarboxylic acid antimicrobial
composition.

34. The method of claim 33, further comprising applying the recycled
composition to poultry during processing.

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35. The method of claim 33, wherein the mixture of peroxycarboxylic acids
comprises peroxyacetic acid and peroxyoctanoic acid.

20 36. The method of claim 35, wherein the mixture of peroxycarboxylic acids
comprises about 30 to about 60 weight-% acetic acid, about 1 to about 15 weight-% octanoic
acid, about 2 to about 12 weight-% hydrogen peroxide, about 6 to about 16 weight-%
peroxyacetic acid, and about 0.1 to about 5 weight-% peroxyoctanoic acid, and about 0.1 to
about 2 weight-% chelating agent.

25 37. The method of claim 33, wherein the recycled mixed peroxycarboxylic acid
antimicrobial composition comprises:

at least about 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to
6 carbon atoms; and

at least 0.5 ppm of one or more carboxylic acids having up to 12 carbon atoms.

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38. The method of claim 37, wherein the recycled mixed peroxycarboxylic acid composition comprises one or more peroxycarboxylic acids having from 2 to 6 carbon atoms and a peroxycarboxylic acid having from 7 to 12 carbon atoms.

5 39. The method of claim 33, wherein the composition was previously applied by a carcass wash or rinse.

40. The method of claim 33, wherein the composition was previously applied by an inside-outside bird wash.

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41. An antimicrobial concentrate composition comprising:
a combination of peroxyacetic acid and peroxyoctanoic acid effective for reducing the microbial burden on a surface of poultry;

15 the combination comprising about 30 to about 60 weight-% acetic acid, about 1 to about 15 weight-% octanoic acid, about 2 to about 12 weight-% hydrogen peroxide, about 6 to about 16 weight-% peroxyacetic acid, and about 0.1 to about 5 weight-% peroxyoctanoic acid, and about 0.1 to about 2 weight-% chelating agent.

20 42. The antimicrobial concentrate composition of claim 41, further comprising stabilizing agent, wetting agent, hydrotrope, thickener, foaming agent, acidifier, pigment, dye, surfactant, or a combination thereof.

25 43. The antimicrobial concentrate composition of claim 42, comprising about 40 weight-% acetic acid, about 3 weight-% octanoic acid, about 6 weight-% hydrogen peroxide, about 10 weight-% peroxyacetic acid, and about 0.8 weight-% peroxyoctanoic acid, and about 0.6 weight-% chelating agent.

30 44. An antimicrobial use composition comprising:
a combination of peroxyacetic acid and peroxyoctanoic acid effective for reducing the microbial burden on a surface of poultry;

the combination comprising about 5 to about 1000 ppm acetic acid, about 0.5 to about 100 ppm octanoic acid, about 1 to about 200 ppm hydrogen peroxide, about 2 to about 300 ppm peroxyacetic acid, and about 0.1 to about 20 ppm peroxyoctanoic acid, and about 3 to about 30 ppm chelating agent.

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45. The antimicrobial use composition of claim 44, further comprising stabilizing agent, wetting agent, hydrotrope, thickener, foaming agent, acidifier, pigment, dye, surfactant, or a combination thereof.

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46. An antimicrobial concentrate composition comprising:

a combination of peroxyacetic acid and peroxyoctanoic acid effective for reducing the microbial burden on a surface of poultry;

the combination comprising an equilibrium mixture resulting from a composition of about 40 to about 70 weight-% acetic acid, about 2 to about 20 weight-% octanoic acid, and
15 about 5 to about 15 weight-% hydrogen peroxide, and about 0.3 to about 1 weight-% chelating agent.

47. The antimicrobial concentrate composition of claim 46, comprising an equilibrium mixture resulting from a composition of about 55 weight-% acetic acid, about 11
20 weight-% hydrogen peroxide, about 0.6 weight-% chelating agent, and about 4 weight-% octanoic acid.

48. An antimicrobial concentrate composition comprising:
a combination of acetic acid, octanoic acid, and hydrogen peroxide effective for
25 producing an equilibrium mixture that reduces the microbial burden on a surface of poultry;
the combination comprising about 40 to about 70 weight-% acetic acid, about 2 to about 20 weight-% octanoic acid, and about 5 to about 15 weight-% hydrogen peroxide, and about 0.3 to about 1 weight-% chelating agent.

49. The antimicrobial concentrate composition of claim 48, further comprising stabilizing agent, wetting agent, hydrotrope, thickener, foaming agent, acidifier, pigment, dye, surfactant, or a combination thereof.

5 50. The antimicrobial concentrate composition of claim 48, comprising about 55 weight-% acetic acid, about 11 weight-% hydrogen peroxide, about 0.6 weight-% chelating agent, and about 4 weight-% octanoic acid.